

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
2 June 2005 (02.06.2005)

PCT

(10) International Publication Number
WO 2005/049199 A1

(51) International Patent Classification⁷: **B01J 23/46**,
C25B 11/04, 1/10, H01M 4/92, 8/18, C02F 1/461

(21) International Application Number:
PCT/EP2004/012290

(22) International Filing Date: 29 October 2004 (29.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
103 50 563.6 29 October 2003 (29.10.2003) DE

(71) Applicant (for all designated States except US): **UMI-
CORE AG & CO KG** [DE/DE]; Rodenbacher Chaussee
4, 63457 Hanau-Wolfgang (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LOPEZ, Marco**
[DE/DE]; Lupinenweg 18, 60433 Frankfurt (DE).
SCHLEUNUNG, Andreas [DE/DE]; Danziger Strasse
4, 63762 Grossostheim-Ringheim (DE). **BIBERBACH,**
Peter [DE/DE]; In den Steinäckern 9, 63517 Rodenbach
(DE).

(74) Agent: **STARZ, Karl, A.**; Umicore AG & Co KG, Patente,
Postfach 1351, 63403 Hanau-Wolfgang (DE).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii)) for all designations

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: **PRECIOUS METAL OXIDE CATALYST FOR WATER ELECTROLYSIS**

(57) Abstract: The invention is directed to iridium oxide based catalysts for use as anode catalysts in PEM water electrolysis. The claimed composite catalyst materials comprise iridium oxide (IrO₂) and optionally ruthenium oxide (RuO₂) in combination with a high surface area inorganic oxide (for example TiO₂, Al₂O₃, ZrO₂ and mixtures thereof). The inorganic oxide has a BET surface area in the range of 50 to 400 m²/g, a water solubility of lower than 0,15 g/l and is present in a quantity of less than 20 wt.% based on the total weight of the catalyst. The claimed catalyst materials are characterised by a low oxygen overvoltage and long lifetime in water electrolysis. The catalysts are used in electrodes, catalyst-coated membranes and membrane-electrode-assemblies for PEM electrolyzers as well as in regenerative fuel cells (RFC), sensors, and other electrochemical devices.



WO 2005/049199 A1